

PROJECT TITLE: Origin of bacterial ether lipids in the environment

DTP Research Theme(s): Living World, Changing Planet

Lead Institution: University of Bristol

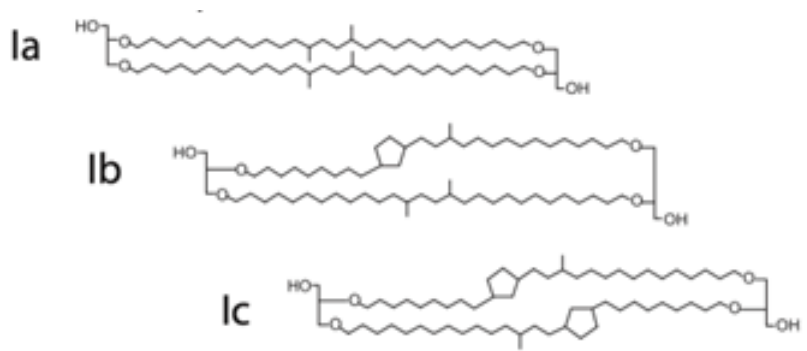
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Project keywords: environment, chemistry, biology, microbes, climate change.



Structure of brGDGTs, ether lipids produced by some bacteria

Project Background

There is a great complexity of microbial life in the environment. This diversity is reflected in the lipid distribution of natural samples and **these lipids** can be preserved for hundreds of millions of years **in the rock record**, forming a basis for our understanding of the long-term evolution of Earth's climate system and Life. However, the factors that drive this diversity in microbial lipids is poorly understood. Decades of research has shown that environmental conditions such as temperature and pH partly drive subtle changes in the lipid distribution of natural samples, but the mechanisms (and their origin) that drive the fundamental differences in lipid synthesis are poorly constrained. This project will focus on the synthesis and origin of a widely distributed set of lipids, branched glycerol dialkyl glycerol tetraethers (brGDGTs).

Project Aims and Methods

You, the student, will use state-of-the-art analytical techniques to answer the question of how branched glycerol dialkyl glycerol tetraethers (brGDGTs) lipids are biosynthesised in bacteria. For this purpose, you will culture bacteria under different conditions. You will also explore the lipid content of natural samples to determine how widespread the proposed intermediates of brGDGT synthesis are in the environment. You will be embedded in the School of Chemistry at the University of Bristol, where the supervisor team led by Dr John Crosby is based. The School consists of a diverse and dynamic international research team and you will have full access to state-of-the-art organic geochemical analytical instrumentation.

Candidate requirements

This project is an excellent opportunity to further develop your skills in chemistry, biology, and natural sciences so that you can secure a rewarding career in academia, industry, or government. We require at least a 2.1 (Hons) degree or equivalent in a relevant quantitative subject (e.g., chemistry, biology, earth sciences). A Master's degree in a relevant subject would be desirable but not essential. We welcome and encourage student applications from under-represented groups. We value a diverse research environment.

Project partners

This project is based on a long-term collaboration with GNS Science in New Zealand ([link](#)) and there is the potential to spend time at GNS science during the PhD to optimise your learning.

Training

You will receive extensive and diverse training in at a leading research institution (and collaborative partner) using exciting and state-of-the-art analytical methods. Specifically, you will be provided with extensive training in organic and biological chemistry and are encouraged to participate in NERC GW4+ DTP training courses to develop both technical and personal skills. Funding is provided to present the results of your research at major international conferences around the globe.

Background reading and references

Sinninghe Damsté, J.S., Hopmans, E.C., Pancost, R.D., Schouten, S., Geenevasen, J.A.J., 2000. *Newly discovered non-isoprenoid glycerol dialkyl glycerol tetraether lipids in sediments*. **Chemical Communications** (17), 1683-1684.

Weijers, J.W.H., Schouten, S., Hopmans, E.C., Geenevasen, J.A.J., David, O.R.P., Coleman, J.M., Pancost, R.D., Sinninghe Damsté, J.S., 2006. *Membrane lipids of mesophilic anaerobic bacteria thriving in peats have typical archaeal traits*. **Environmental Microbiology** 8 (4), 648-657.

Chen, Y., Zheng, F., Yang, H., Yang, W., Wu, R., Liu, X., Liang, H., Chen, H., Pei, H., Zhang, C., Pancost, R.D., Zeng, Z., 2022. *The production of diverse brGDGTs by an Acidobacterium providing a physiological basis for paleoclimate proxies*. **Geochimica et Cosmochimica Acta** 337, 155-165.

Useful links

<http://www.bristol.ac.uk/chemistry/courses/postgraduate/>

Bristol NERC GW4+ DTP Prospectus:

<http://www.bristol.ac.uk/study/postgraduate/2024/sci/phd-great-western-four-doctoral-training-partnership-nerc/>

How to apply to the University of Bristol:

<http://www.bristol.ac.uk/study/postgraduate/apply/>

Please note: If you wish to apply for more than one project please contact the Bristol NERC GW4+ DTP Administrator to find out the process for doing this.

The application deadline is Tuesday 9 January 2024 at 2359 GMT. Interviews will take place from 26 February to 8 March 2024.

For more information about the NERC GW4+ Doctoral Training Partnership please visit

<https://www.nercgw4plus.ac.uk>.

General Enquiries: Bristol NERC GW4+ DTP Administrator

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